DEPARTMENT OF SYSTEMS ENGINEERING

Engineering Building, Suite 202
(970) 491-7067
enr.colostate.edu/se/ (https://www.engr.colostate.edu/se/)

Thomas Bradley, Department Head
Ingrid Bridge, Advisor and Graduate Program Coordinator

Graduate
Graduate Programs in Systems Engineering

The Master of Engineering program produces graduates who can design and manage complex multidisciplinary engineering systems with a rigorous systems engineering approach. The applied focus in courses builds skills that can be utilized immediately in current projects and prepares students for future career opportunities.

Graduates of the Master of Science program will be capable of designing and managing complex multidisciplinary engineering systems with a rigorous systems engineering approach. The research component of the thesis- and project-based M.S. programs equips students with cutting edge skills in specific focus areas, preparing them for future career opportunities.

The Ph.D. prepares students to become leaders in systems engineering. Throughout the program, students produce significant academic contributions in terms of original research to the field, driving advancements and leading to improvements in energy efficiency, environmental impact, cybersecurity, and economic growth, among other areas of application for systems engineering.

The Doctor of Engineering in Systems Engineering degree will include core studies in systems engineering and its applications to complex systems in a working environment. Curriculum includes professional and applied/translational courses, a systems engineering practicum, and a dissertation to assist working professionals attain a higher level of value to their organizations.

Master's Programs

• Master of Science in Systems Engineering, Plan A
• Master of Science in Systems Engineering, Plan B (http://catalog.colostate.edu/general-catalog/colleges/engineering/systems-engineering/systems-engineering-ms/)
• Master of Engineering, Plan C, Systems Engineering Specialization (http://catalog.colostate.edu/general-catalog/colleges/engineering/plan-c-me-systems-engineering-specialization/)

Ph.D.
Ph.D. in Systems Engineering (http://catalog.colostate.edu/general-catalog/colleges/engineering/systems-engineering/systems-engineering-phd/)

Professional Doctorate

Doctor of Engineering in Systems Engineering (http://catalog.colostate.edu/general-catalog/colleges/engineering/systems-engineering/systems-engineering-professional-doctorate/)

Graduate Certificates

Certificate in Systems Engineering Practice (http://catalog.colostate.edu/general-catalog/colleges/engineering/systems-engineering/graduate-certificate-systems-engineering-practice/)

Courses

SYSE 501 Foundations of Systems Engineering Credits: 3 (3-0-0)
Course Description: Functional components of systems engineering, application of systems engineering to practical problems, system life-cycle process.
Prerequisite: None.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 501, ENGR 501, or SYSE 501.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 512 Systems Sensing and Imaging Analysis Credits: 3 (3-0-0)
Course Description: Sensing, sampling, filtering, transducing, and transmission of information to transform physical data to the digital domain. Subsequent processing of image and digital data, restoration, analysis and classification to problems in inspection, authentication, color science, biometrics, and signal/image characterization.
Prerequisite: ECE 303 or STAT 303 or STAT 315.
Registration Information: Sections may be offered: Face-to-Face, Mixed Face-to-Face, or Online. Credit not allowed for both SYSE 512 and ENGR 681A2.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 530 Overview of Systems Engineering Processes Credits: 3 (3-0-0)
Course Description: Systems engineering life-cycle process and analysis techniques. Reliability and robustness.
Prerequisite: ECE 303 or STAT 303 or STAT 315.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 530, ENGR 530, or SYSE 530.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 532 Dynamics of Complex Engineering Systems Credits: 3 (3-0-0)
Also Offered As: ECE 532.
Course Description: Higher-level behavior and issues that emerge from interaction between components in complex socio-technical systems.
Prerequisite: ECE 501, may be taken concurrently or ENGR 501, may be taken concurrently or SYSE 501, may be taken concurrently.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: ECE 532, ENGR 532, or SYSE 532.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Restrictions</th>
<th>Registration Information</th>
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<tr>
<td>SYSE 534</td>
<td>Human Systems Integration</td>
<td>3 (3-0-0)</td>
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<td>Evaluation of human capabilities and limitations when designing and evaluating complex systems in order to enhance safety, efficiency, usability, and reduce life cycle costs.</td>
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<td>SYSE 556</td>
<td>Systems Engineering Architecture</td>
<td>3 (3-0-0)</td>
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<td>Observation/classification of systems architecture. Systems architecture principles and critical evaluation through design studies.</td>
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<td>SYSE 567</td>
<td>Cybersecurity Awareness for Systems Engineers</td>
<td>3 (3-0-0)</td>
<td>ENGR 501 or SYSE 501</td>
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<td>Cybersecurity principles, practices, technologies, design approaches, and terminology needed to incorporate cybersecurity principles into effective systems designs.</td>
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<td>SYSE 569</td>
<td>Analytics in Systems Engineering</td>
<td>3 (3-0-0)</td>
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<td>Focus on the appropriate application of data mining, knowledge generation, data analytics and data algorithmics to large complex systems. Demystify &quot;big data&quot; for systems engineers as applied to intelligent systems.</td>
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<tr>
<td>SYSE 571</td>
<td>Cybersecurity Awareness for Systems Engineers</td>
<td>3 (3-0-0)</td>
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<td>Demonstrate techniques and strategies to respond to requirements, design, development and manufacturing decisions, while optimizing for cost at the organizational, program, and project level.</td>
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<td>SYSE 573</td>
<td>Cost Optimization for Systems Engineers</td>
<td>3 (3-0-0)</td>
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<td>Demonstrate techniques and strategies to respond to requirements, design, development, and manufacturing decisions, while optimizing for cost at the organizational, program, and project level.</td>
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<td>SYSE 596</td>
<td>Group Study-Systems Engineering Skills</td>
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<td>Topics related to building specialized skills relevant for the systems engineering field.</td>
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<td>SYSE 597</td>
<td>Group Study in Systems Engineering</td>
<td>3 (0-0-3)</td>
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<td>Special and contemporary topics in the field of systems engineering.</td>
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<td>SYSE 602</td>
<td>Systems Requirements Engineering</td>
<td>3 (3-0-0)</td>
<td>ENGR 501 or SYSE 501</td>
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<td>Introduction to the rigorous requirements process within systems engineering, including system requirements analysis, requirements decomposition, allocation, tracking, verification, and validation.</td>
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<td>SYSE 603</td>
<td>Introduction to Systems Test and Evaluation</td>
<td>3 (3-0-0)</td>
<td>ENGR 501 or SYSE 501</td>
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<td>Test and evaluation of systems at both the component and systems levels to provide insights into how systems succeed or fail based on test methodologies.</td>
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<td>SYSE 667</td>
<td>Advanced Model-Based Systems Engineering</td>
<td>3 (3-0-0)</td>
<td>ENGR 501 or SYSE 501</td>
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<td>Theory and application of formal systems architecture modeling.</td>
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SYSE 695  Independent Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

SYSE 699 Thesis Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

SYSE 710 Leadership/Innovation in Systems Engineering  Credits: 3 (3-0-0)
Course Description: Background in technical leadership skill sets, systems engineering skillsets, and intellectual toolkit to develop a successful applied and translational research project/practicum.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Bachelor’s degree required. Sections may be offered: Online. Course is not available for credit toward the PhD in Systems Engineering. Credit not allowed for both ENGR 710 and SYSE 710.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 711 Ethics in Systems Engineering Credit: 1 (0-0-1)
Course Description: Ethical principles and their application to systems engineering.
Prerequisite: ENGR 501 or SYSE 501.
Restriction: Must be a: Graduate, Professional.
Registration Information: Offered as an online course only. Credit not allowed for both ENGR 711 and SYSE 711.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SYSE 786 Applied Systems Engineering Practicum Credits: Var[1-9] (0-0-0)
Course Description: Research techniques, critical thinking, evaluation criteria, and methods of technical writing.
Prerequisite: ENGR 710 or SYSE 710.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of advisor.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

SYSE 795 Independent Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

SYSE 799A Dissertation: PhD Credits: Var[1-18] (0-0-0)
Course Description: Dissertation for PhD in System Engineering Program.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of advisor. Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

SYSE 799B Dissertation: Professional Doctorate Credits: Var[1-9] (0-0-0)
Course Description:
Prerequisite: SYSE 786.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of advisor. Admission to Professional Doctorate of Engineering, Systems Engineering.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.